MOBI-AGE: Promoting urban mobility in ageing populations

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Abstract: In the current panorama of many cities, difficulties associated with public transportation and with public space, limit the access of the elderly, also creating difficulties for other age groups. One of the objectives of the project is to carry out a review of the literature on mobility and accessibility characteristics of the elderly. Another is to develop a methodology for diagnosis of age friendly spaces, analysing the area and the population affected. The MOBI-AGE project intends to use two case studies, Coimbra and Porto. This article is a first attempt to identify the main characteristics and main indicators of the mobility of the elderly and the quality of the public space, whose optimization can contribute to an accessible city for all.

Keywords: age-friendly cities, elderly urban mobility, accessibility, central historical spaces, public space.

Introduction

Some paradigms related to the mobility of goods and people have been changing, especially since some of the factors that interfere with mobility patterns, such as age, have changed. In fact, the demographic pyramid is changing, the elderly population is increasing and, consequently, mobility patterns have also changed in the last decades. If up to now the quantitative of this (elderly) population could be considered balanced with that of the younger population, it is found that it is expanding worldwide, and in many countries the number of people over 65 exceeds the number of persons under 18 years of age. This population, with some restrictions in terms of personal mobility, does not always have easy access to urban spaces and to components of the transportation system.

The analysis of the aging index, which is shown in the following chart (Figure 1), also shows the strong aging trend of the population of Portugal, with some prominence for the municipalities of Coimbra and Oporto.
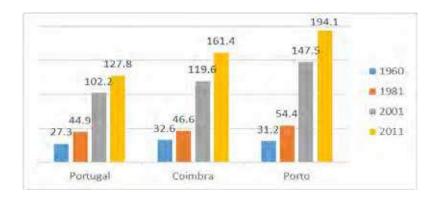
Figure 1- Evolution of the index of aging according to the Census (ratio-%) (Source: PORDATA)

The urban centers concentrate a good part of the population aged in the cities, which generally inhabits the oldest buildings. By definition and in most of these cities, it is in these areas that historical monuments and other factors of tourist attraction are located. Senior tourism is also a consequence of the general aging of the population and has been increasing. This scenario means that urban centers, especially historic centers, are places where more seniors are concentrated in comparison with other areas of the city, whether residents or visitors. In these areas, neither the urban public space nor the transport system are adequately adapted to the access and mobility needs of this age group.

Seniors have specific travel needs that can affect their mode of transportation choices. In order to encourage the maintenance of activity and the adoption of sustainable travel practices during aging, it is crucial to understand what factors influence the mobility of the elderly. In addition, it is necessary to understand which indicators characterize the accessibility of the elderly to the city's public spaces and to the collective transportation system. This article aims to consider these two issues (accessibility and mobility) and develops a framework of factors related to their impact among the elderly.

Thus, the MOBI-AGE project (supported by the FCT-MIT Portugal funding program, referred to in the acknowledgments) aims to develop a literature review focused on the themes of urban aging, healthy aging, active aging and elderly mobility and accessibility. In addition, and through two case studies, one in Coimbra and another in Porto, emphases the adequacy of the urban space and the transportation system to the needs of the older population. At this stage and from the literature review, it was possible to identify the main factors that contribute to an accessible city for all or an age-friendly city.

After this introductory chapter, the MOBI-AGE project is presented and, following, a review of the literature on urbanistic barriers in urban areas. In the first place, the factors that characterize the mobility of the elderly are discussed, exploring the relationship between their personal characteristics and their travel patterns, their movement through public transportation, and also the urban design and its impacts on the pedestrian mode. Next, the methodology is presented, namely emphasizing the factors that characterize the accessibility of the elderly to the city public spaces and to the collective transport system are synthesized. It is also characterized the accessibility to the network of transport

and communication infrastructures and the location of activities of interest for the elderly. Then, ways of acting are suggested. Finally, a chapter is presented with some conclusions.

The MOBI-AGE Project

The MOBI-AGE project is an exploratory project whose objectives are to review the literature on the mobility and accessibility of the elderly in the transportation system, the suitability of the urban space at the level of the urban design and infrastructures of paths and the accessibility to the pedestrian paths, both public buildings and access points of the transport system. Using some information from this review, two case studies (selected areas of urban rehabilitation areas) will be analyzed, one in the historical center of Coimbra and another in the historical center of Porto.

These studies aim to identify needs and failures that limit the mobility and accessibility of the elderly population. This process goes beyond cabinet work and also aims to create social innovation by holding participatory and dynamic collaboration sessions with this population, assessing more precisely needs and aspirations. The review of the literature will contribute to the preparation of the queries, to be applied in these case studies.

As a final goal, the project intends to elaborate a methodology for the diagnosis and classification of historical central spaces as to their suitability in terms of mobility and accessibility for the elderly population. This methodology should inform the future development of interactive information platforms for end users of the space, both residents and visitors, that will allow them to find solutions to their travel needs.

Characteristics of Mobility Of The Elderly In The Urban Environment - Literature Review

Introduction

We consider it important to evaluate the impacts of the built environment and transportation systems on the mobility and accessibility of the elderly. During the study, there was a need to differentiate between mobility and accessibility because, since they are different concepts, they require different approaches. Mobility is able to travel without limits, have information about travel options, know how to use them, use them and have the means to pay them [1]. Accessibility is a term that describes the greater or lesser ease with which people access goods and services, facilitated either by well-organized transport systems and that move people efficiently as more activities are achieved by these people, also benefiting from quality of infrastructure [2].

Thus, this literature review began, in the first part, to study the theme of elderly mobility, addressing the relationship between the characteristics of the elderly and their travel choices, followed by a study on the needs and barriers of the elderly population in the use of public transport and, finally, an analysis of the impact of urban design in the pedestrian mode, especially the elderly. In the second part, the theme of the accessibility of the elderly to the urban space was studied, analyzing the favorable and inhibiting characteristics of the transport and communications infrastructure network, access to the public space and the transportation system, also identifying the places of interest for the population.

The characteristics of the elderly and their travel choices

For men and women who fail to drive, alternative means of transportation become a necessity. However, the effective use of alternative transport is relatively low [3]. Therefore, a good understanding of the travel patterns, needs and factors influencing the mobility of the elderly is needed to design an improved access to public transport and, in general, a life of active aging while maintaining economic and social participation, as well as the quality of life.

Depending on the age group, the population has characteristics that may influence their mobility. In order to understand how the elderly move and identify mobility patterns, it was considered important to analyse, in a general way, the relationship between their characteristics and their travel options and the choice of mode of transportation.

People tend to slow down walking with advancing age [4]. The study [4] concluded that while young adults (25-34 years) walk at an estimated velocity of 1.25m/s, the elderly (65 years or more) walk at an estimated velocity of 0.96m / s.

As people get older, they are making fewer and fewer trips, with shorter duration and less distance. This phenomenon is more pronounced in the female population. Characteristics such as being single, having poor health conditions, low educational level or low income are also negatively associated with the mobility of the elderly population.

Women are more dependent on walking, cycling and public transport, while men use the car more often. Possession of a valid driving license is positively related to mobility in general and to the frequency of travel and, of course, the likelihood of traveling by private car. Older, high-income people tend to use less collective transportation.

The elderly in collective transport

Collective transportation can allow autonomous journeys for those who cannot or do not choose to drive. When older adults (60 years of age or older) have inadequate access to the transport system, they tend to experience low levels of physical activity, reduced independence and high health risks [5]. Strengthening the mobility capacity of older people should be seen as an integral part of efforts to promote the overall development of society, especially in the transport sector [6]. From the point of view of social and economic quality of life, public transport services should be increasingly friends with the elderly to ensure that older people can maximize mobility and access to the opportunities they need to access [7]. Next, some of the travel characteristics that are positively related to the use of collective transportation by the elderly are presented.

Also the integration of transport in certain buildings, a subject still under-explored, can allow a varied set of solutions. Buildings can be excellent supports for transport systems, allowing not only the use of the public space by atriums related to the street and urban structure, but also the greater articulation of the pedestrian circulation channels with the other sectors of the transport system, allowing greater comfort (in relation to the type of climate) and accessibility of the pedestrian, in particular of the elderly [8].

An urban space suitable for pedestrians also has a positive connection with the probability of an elderly person making a collective transport trip. Older people prefer to travel by bus due to cheaper travel fares and taxi fares due to greater accessibility. Older people tend to avoid rush hour and prefer to travel during other times of the day. The density of bus stops encourages the population in question to use public transport more frequently [8].

The impact of urban design in pedestrian mode

Pedestrian mode is a critical component of a transportation system. In addition to driving, it is the most popular mode of transport compared to other modes of transport, such as public transport or taxi [9]. Walking is often necessary even when using a car or public transport [10]. Adults aged 65 years and over resort to this mode of transport on a substantial part of their journeys, around 9% [9], and for most of the elderly almost all journeys begin and end by walking [11]. Thus, knowledge about the characteristics of urban design that can facilitate an active lifestyle can allow the development of a system of decision support for public health, land use and transport policies [12].

Older people prefer neighbourhoods with safe and continuous walks, with aesthetic pleasant and several pedestrian paths to make the movement easier and pleasant. The existence of street lighting and the possibility of perceiving that there is little traffic are essential aspects to your sense of security. The presence of slopes and microclimatic conditions (sunlight, ventilation, humidity) influence the travel choices of elderly people who prefer mild temperatures and low humidity to opt for active mobility.

Concerning the sense of security, the elderly feel more motivated to walk if there are other people on the street, whether walking, running or cycling, or the presence of a police or security. As for the time of day, the elderly prefer to go hiking early in the morning. On the contrary, large crowds, people who cause disturbances or individuals to ask for money can be considered obstacles.

The elderly population takes into account the characteristics of the urban environment when deciding to walk and is more likely to do so if the pedestrian path is quiet, clean and maintain. The presence of parks, gardens, trees and shadows, places to rest, eat or use the bathroom, variety of views and activities and accessibility to public transport are also decisive characteristics. In addition, the existence of ramps on sidewalks, as well as the presence of handrails in the presence of stairs or steps, signposted walkways and routes with low pedestrian traffic (one way), are factors that influence the walk of the elderly. In contrast, the existence of abandoned or under construction houses, garbage, inadequate lighting, fallen trees or branches, poorly lit plant walkways with unexpected interruptions forcing individuals to walk on the road with vehicles have been identified as inhibitors of use of the pedestrian mode by the elderly.

In addition to its role in optimizing pedestrian circulation, it is also up to the urban design to promote interfaces (creation and strategic location), adequate modes of transport and accessibility that are complementary to the pedestrian mode, favouring access to public transport in pedestrian areas and location of shelters and stops in a suitable way [8].

The accessibility of the elderly to the urban space

Accessibility is one of the crucial components to be considered in cities that are favorable to the elderly [13]. Accessibility refers to the possibility for citizens to achieve the goods and services they need, as well as all other activities [9].

In order to increase urban accessibility for the elderly, it is fundamental to think of both the infrastructure network (transport and communications) and the location of activities of interest [14]. Intervening in these two elements means improving urban accessibility for all groups, making physical limitations more easily accommodated [15].

Transport and communications infrastructure network

The concept of accessibility is related to the way people achieve the desired activities through transport systems [2], [9]. Systems that are efficient and allow people to reach a greater number of locations per unit of time are viewed positively [9].

The public transport system should be fully accessible to all citizens. Limited access to collective and private transport has often been identified as one of the main factors contributing to the social isolation and economic poverty of certain groups. Older people are often identified as being socially excluded because of the difficulties associated with journeys away from their homes, to access services and facilities, especially for non-car drivers.

Barriers related to the feeling of low personal safety, difficulties in carrying heavy loads, few bus stops, long distances on foot, low population density, poorly designed and/or poorly maintained bus stops, a low ergonomic vehicle design, pedestrian infrastructure in poor condition, difficulty getting on or off the bus, parking cars at bus stops, insufficient time for crossing in traffic lights and crossings in dangerous places, have serious implications for the elderly users in terms of security perception, use and comfort. The elderly population favours, on the contrary, factors such as punctuality and little waiting time, cleanliness, the existence of bathrooms, low travel costs, safe driving and seats available.

Location of activities of interest

Accessibility is also related to user use and satisfaction of public areas [13]. There is thus a need to identify the destinations that are of interest to the elderly, as they have different needs and interests in relation to younger age groups. It has been found that having nearby destinations such as restaurants, libraries, pharmacies, grocery stores, hospitals, banks and various stores, within a range of action easily reachable on foot or by public transport can contribute substantially to the accessibility of the elderly to the public space.

Methodology of Intervention

Summary of indicators to consider

After this review of the literature, it is possible to make a synthesis identifying the main indicators of an inclusive and friendly city of the elderly, while being of benefit to all other age groups. The

distinction between the concepts of mobility and accessibility was fundamental in this process in order to better identify the factors associated with the way the elderly perceive and use public transport and the public space in general. With regard to the mobility of the elderly, we sought to understand the mobility patterns, their movement through collective transportation, identifying barriers and needs in the use of these modes and how to promote the improvement of the transportation system. In the case of accessibility, they assessed their difficulties in accessing the transport system and public places, emphasizing the importance of good urban design in this process.

Barriers associated with pedestrian access to stops and low population density were identified as main barriers to the use of collective transportation. The characteristics of urban space positively related to the use of public transport have to do with well-designed and maintained infrastructures, as well as with high population density and jobs. Other barriers are the long distances to walk, service availability, stocking and waiting times. On the other hand, the high density of collective shuttles, frequency during off-peak periods, clear information on routes and waiting times, cheap travel fares and punctuality are positively related to the use of public transportation. Vehicle-related barriers such as difficulties in carrying heavy loads and entering or leaving the vehicle (lack of ramps) were also identified. Vehicles with access ramps, shelters at the stations and comfortable and available seating, as well as cleaning, are seen as characteristics that attract the elderly to public transportation. Finally, the barriers encountered in relation to personal safety were speed and volume of traffic, insufficient crossing time in traffic lights, crossings in dangerous places, inappropriate behaviour of other passengers, improper parking at bus stops and high crime rate in the neighbourhood. Positive indicators are measures of calm, speed reduction and presence of police or security.

In terms of urban design, many barriers related to the mobility and accessibility of the elderly, such as empty houses and abandoned lots, garbage and pollution, were also identified. In contrast, the characteristics favorable to the elderly are a well-maintained built space, the presence of parks, gardens, trees and shade, places to rest, eat or use the bathroom, a quiet and peaceful environment, buildings or statues of personal significance or historic and clean. We have identified barriers related to the state of the rides, such as trees or fallen branches, walks covered with weeds and / or damaged. The characteristics of the walks positively related to the mobility and the accessibility of the elderly are continuity and good connections to the rest of the network, with ramps, illumination in the crossings, pedestrian paths and adequate pavement, the presence of connections in escalators or elevators to overcome differences of way to allow continuous paths and also the existence of handrails in the presence of stairs or steps. Identifying neighborhood characteristics related to older people's sense of security found barriers such as criminal activity, slow or inadequate police response to crime, inadequate lighting, the presence of windowless walls, connections through parks and large crowds. On the other hand, the public lighting, the presence of police or security, the traffic lights with sufficient passage time and the presence of people were identified as positive aspects. Finally, we found that the lack of access to places of interest was negatively related to the mobility and accessibility of the elderly. Instead, having access to public spaces that integrate older people with younger people, families with children and tourists, parks, public transportation, health facilities, pharmacies, restaurants, libraries, grocery stores, banks and stores were seen as positive features.

Sizing principles

On the basis of the conclusions obtained from this review of the literature, namely the identification of barriers and characteristics that promote active mobility and the accessibility of the elderly to public spaces and the transport system, it was possible to define, from the outset, some design principles that can be useful to propose a first set of actions in favour of a city that is friendly to the elderly, listed with available and applicable legislation.

This process is still under development.

Conclusions

This literature review allowed to identify the main characteristics and possible indicators of suitable cities and spaces for the elderly, to be applied in the case studies. This study was vital to understand the barriers and preferences of the elderly on the use of public transportation and public space in general, as well as identify their perception of accessibility and usability in relation to their interests and needs. In the next phase, we will identify the direct relationship between the identified characteristics and the indicators that we intend to quantify and evaluate, which will be crucial in the next stage of the project, also contributing to the preparation of the form, namely inquiry, to be applied in our studies case - within the selected focus groups.

The definition of these indicators is crucial for our main objective, to contribute to the creation of a diagnostic methodology that will lead to recommendations for the rehabilitation of the historic centers of the cities of Coimbra and Oporto (illustrative of centers with high proportions of elderly, residents or visitors) in areas that are friendly to the elderly. In addition to contributing to the development of a methodology for the diagnosis and classification of historic urban centers - and consequent recommendations for urban design and reformulation of the public transport system - it is hoped that this methodology could constitute a decision support system in the future development of interactive information platforms.

Acknowledgements

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